



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
27.04.2011 Bulletin 2011/17

(51) Int Cl.:
G03G 21/16 (2006.01)

(43) Date of publication A2:
11.06.2008 Bulletin 2008/24

(21) Application number: **07122167.5**

(22) Date of filing: **03.12.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

- **Yang, Jin-kyu**
Gyeonggi-do
Seongnam-si (KR)
- **Lee, Sang-woon**
Seoul (KR)
- **Park, Eun-sang**
Gyeonggi-do
Suwon-si (KR)

(30) Priority: **06.12.2006 KR 20060122948**
18.12.2006 KR 20060129578
20.09.2007 KR 20070096135

(74) Representative: **Waddington, Richard**
Appleyard Lees,
15 Clare Road
Halifax HX1 2HY (GB)

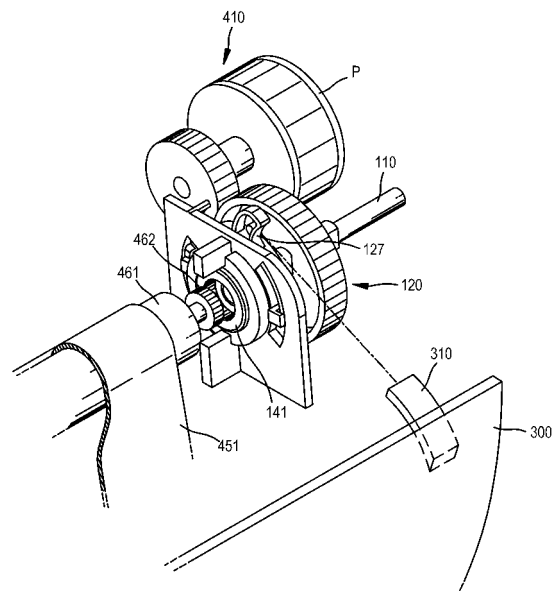
(71) Applicant: **Samsung Electronics Co., Ltd.**
Gyeonggi-do 442-742 (KR)

(72) Inventors:
• **Jung, Woo-chul**
Youngin-si (KR)

(54) **Coupling apparatus and image forming apparatus employing the same**

(57) An image forming apparatus includes a main body unit (410) which has an image forming unit (430); a door unit (300) which couples with the main body unit (410) to open and close the main body unit (410), and has a projection (310) at one side thereof; a mid-transfer unit (450) which couples with the door unit (300); a coupling knob (120) which is provided in the main body unit (410) and rotates in cooperation with pressure of the projection (310) when the door unit (300) is closed; and a coupling apparatus which is provided in the main body unit and transmits a driving force from the main body unit (410) to the mid-transfer unit (450) in cooperation with the rotation of the coupling knob (120).

FIG. 7





EUROPEAN SEARCH REPORT

Application Number
EP 07 12 2167

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2003 280489 A (CANON KK) 2 October 2003 (2003-10-02)	1-3	INV. G03G21/16
Y	* abstract; figures 1-7 * * paragraph [0021] - paragraph [0029] *	4-16	
Y	JP 09 114164 A (CANON KK) 2 May 1997 (1997-05-02) * abstract; figures 2-9 * * paragraph [0072] - paragraph [0077] *	4-16	
A	US 2006/104662 A1 (KAWASUMI RYOICHI [JP]) 18 May 2006 (2006-05-18) * paragraph [0040] - paragraph [0050]; figures 3, 4 *	1-16	
A	JP 2002 149037 A (BROTHER IND LTD) 22 May 2002 (2002-05-22) * abstract; figures 3-11 * * paragraph [0053] - paragraph [0081] *	1-16	
A	US 2006/239716 A1 (KIM SUNG-DAE [KR] ET AL) 26 October 2006 (2006-10-26) * paragraph [0044] - paragraph [0054]; figures 2-9 *	1-16	
<p>The present search report has been drawn up for all claims</p>			TECHNICAL FIELDS SEARCHED (IPC)
			G03G B41J
Place of search		Date of completion of the search	Examiner
Munich		4 November 2010	Billmann, Frank
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

2

EPO FORM 1503 03 82 (P04C01)



Application Number

EP 07 12 2167

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-16

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



LACK OF UNITY OF INVENTION
SHEET B

Application Number

EP 07 12 2167

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-16

Image forming apparatus comprising a door having a projection to open and close a main body, a coupling knob rotating in cooperation with pressure of the projection when the door is closed to transmit a driving force from the main body to a mid-transfer unit.

The technical problem to be solved by these features is to improve a drive transmission to a mid-transfer unit of an image forming apparatus.

2. claim: 17

Coupling apparatus comprising a rotatable shaft installed in a frame; a coupling knob rotatably coupled to the frame and arranged to rotate coaxially with and independently of the shaft by an external force; a coupling link coupled to the frame movably in the axial direction of the shaft according to the rotation of the coupling knob; a coupling unit coupled to the shaft arranged to rotate along with the shaft and to move between a coupling position and a decoupling position in the axial direction of the shaft according to the movement of the coupling link, to couple a component to a driving unit; and an elastic member installed around the shaft to elastically bias the coupling unit to the decoupling position.

The technical problem to be solved by these features is to improve a coupling mechanism for coupling a component to a driving unit.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 12 2167

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-11-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 2003280489	A	02-10-2003	NONE	
JP 9114164	A	02-05-1997	NONE	
US 2006104662	A1	18-05-2006	CN 1790192 A	21-06-2006
			EP 1659457 A2	24-05-2006
			KR 20060052604 A	19-05-2006
JP 2002149037	A	22-05-2002	JP 3671835 B2	13-07-2005
US 2006239716	A1	26-10-2006	CN 1854926 A	01-11-2006
			DE 602006000969 T2	20-05-2009
			EP 1715390 A1	25-10-2006
			JP 2006301640 A	02-11-2006